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CLAIMS

- Process for the preparation of a block copolymer, the process being carried out in the presence of a multifunctional initiator and comprising at least one enzymatically catalyzed homo- or copolymerization reaction and at least one non-enzymatically catalyzed controlled homo- or copolymerization reaction, characterized in that the non-enzymatically catalyzed controlled homo- or copolymerization reaction is chosen from the group comprising a free radical polymerization reaction, an ionic polymerization reaction, a polycondensation reaction, and a ring opening polymerization (ROP) reaction.
 - Process according to claim 1, wherein the non-enzymatically catalyzed controlled polymerization reaction is a nitroxide mediated radical polymerization reaction.
- Process according to claim 1 or claim 2, wherein the non-enzymatically
 catalyzed controlled polymerization reaction involves the polymerization of a monomer selected from the group comprising (meth)acrylates, styrenes, acrylonitriles, vinyl pyridines, vinyl formamide, (meth)acrylamides, and maleimides.
- Process according to any one of claims 1-3, wherein the enzymatically
 catalyzed polymerization reaction is a ROP reaction.
 - 5. Process according to claim 4, wherein optionally substituted ϵ -caprolactone is used as a monomer.
 - 6. Process according to claim 5, wherein the optionally substituted ϵ -caprolactone is a substituted ϵ -caprolactone.
- 25 7. Process according to any one of claims 1-6, wherein the enzymatically catalyzed polymerization reaction is catalysed by a lipase of class EC 3.1.1.3.
 - 8. Process according to claim 7, wherein the lipase is chosen from the group comprising Candida antarctica Lipase B, Pseudomonas cepacia (lipase PS-30), porcine pancreatic lipase (PPL), Candida cylindracea (lipase CCL), Candida Rugosa (lipase CR), Mucor Miehei (lipozyme), Pseudomonas aeruginosa (lipase PA), Pseudomonas fluorescence (lipase PF), and
 - 9. Process according to any one of claims 1-8, wherein at least one enzymatically catalyzed polymerization reaction and at least one non-

Aspergillus niger (lipase A).

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enzymatically catalyzed controlled polymerization reaction are carried out in bulk.

- 10. Process according to any one of claims 1-9, wherein at least one enzymatically catalyzed polymerization reaction and at least one non-enzymatically catalyzed controlled polymerization reaction are carried out in one pot.
 - 11. Process according to claim 10, wherein at least one enzymatically catalyzed polymerization reaction and at least one non-enzymatically catalyzed controlled polymerization reaction are carried out simultaneously.
- 10 12. Chiral block copolymer wherein at least one block comprises at least one substituted ε-caprolactone derivative.
 - 13. Chiral block copolymer according to claim 12 having an M_w/M_n in the range 1.1-2.5.
- 14. Chiral block copolymer according to claim 12 or claim 13, obtainable by a process according to any one of claims 1-11.